

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
 US Department of Commerce
 United States Patent and Trademark
 Office, PCT
 2011 South Clark Place Room
 CP2/5C24
 Arlington, VA 22202
 ETATS-UNIS D'AMERIQUE
 in its capacity as elected Office

| | |
|---------------------------------------------------------------------------------|---------------------------------------------------------------------|
| Date of mailing (day/month/year) 14 June 2001 (14.06.01) | Applicant's or agent's file reference P232PC00 |
| International application No. PCT/IS00/00010 | Priority date (day/month/year) 01 October 1999 (01.10.99) |
| International filing date (day/month/year) 02 October 2000 (02.10.00) | |
| Applicant VILHJALMSSON, Jon, Reynir et al | |

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
 26 April 2001 (26.04.01)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was
☐ was not

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made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

| | |
|------------------------------------------------------------------------------------------------------|---------------------------------------------|
| The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland | Authorized officer Claudio Borton |
| Facsimile No.: (41-22) 740.14.35 | Telephone No.: (41-22) 338.83.38 |

PATENT COOPERATION TREATY

From the:
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

A&P ARNASON
Borgartun 24
105 Reykjavik

A & P Arnason
Intellectual Property Group

14 AUG. 2001

RECEIVED
with thanks

PCT

WRITTEN OPINION

(PCT Rule 66)

10.11.01

| | | |
|-----------------------------------------------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------------------|
| Date of mailing (day/month/year) | | 10.08.2001 |
| Applicant's or agent's file reference P 232 PC 00 | | REPLY DUE within 3 month(s) from the above date of mailing |
| International application No. PCT/IS00/00010 | International filing date (day/month/year) 02/10/2000 | Priority date (day/month/year) 01/10/1999 |
| International Patent Classification (IPC) or both national classification and IPC G01G3/10 | | |
| Applicant MAREL HF. et al. | | |

- This written opinion is the first drawn up by this International Preliminary Examining Authority.
- This opinion contains indications relating to the following items:
 - ☒ Basis of the opinion
 - ☐ Priority
 - ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - ☐ Lack of unity of invention
 - ☐ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - ☐ Certain document cited
 - ☐ Certain defects in the international application
 - ☐ Certain observations on the international application

- The applicant is hereby invited to reply to this opinion.


When? See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).

How? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

Also: For an additional opportunity to submit amendments, see Rule 66.4.
For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 bis.
For an informal communication with the examiner, see Rule 66.6.

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.

- The final date by which the international preliminary examination report must be established according to Rule 69.2 is: 01/02/2002.

Name and mailing address of the international preliminary examining authority:
 European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0 Tx: 523656 epmu d
Fax: +49 89 2399 - 4465

Authorized officer / Examiner

Koeck, A

Formalities officer (incl. extension of time limits)

Marnell, J

Telephone No. +49 89 2399 2557



WRITTEN OPINION

International application No. PCT/IS00/00010

I. Basis of the opinion

1. With regard to the **elements** of the international application (Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed"):

Description, pages:

1-12 as originally filed

Claims, No.:

1-17 as originally filed

Drawings, sheets:

1/2-2/2 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

WRITTEN OPINION

International application No. PCT/IS00/00010

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been and will not be examined in respect of:

☒ the entire international application,

☐ claims Nos. ,

because:

☒ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):
see separate sheet

☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☐ no international search report has been established for the said claims Nos. .

2. A written opinion cannot be drawn due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

☐ the written form has not been furnished or does not comply with the standard.

☐ the computer readable form has not been furnished or does not comply with the standard.

**WRITTEN OPINION
SEPARATE SHEET**

International application No. PCT/IS00/00010

III. Non establishment of opinion

1. The present claims relate to a method for providing a measure of an item, i.e. processing information and mathematical schemes for weighting items. The application will thus not be examined according to Rules 67.1 i), iii), v) and vi) PCT.



Intellectual Property
Group

European Patent Office
D-80298 Munich
Germany

JC13 Rec'd PCT/PTO 28 MAR 2002

BY TELEFAX TO 00 49 089 2399 4465 AND CONFIRMATION COPY BY
MAIL - Total 3 pages incl. this one

- 7. Dez. 2001

Reykjavik, December 7, 2001

International Patent Application No. PCT/IS00/00010
Multi-filter
Marel hf.
Our ref: P232PC00

Associated with
LOGOS - legal services
and Plougmann, Vingtoft
& Partners

Reykjavik, Copenhagen,
Århus, Munich, Alicante

Patents, Trademarks,
Designs, Documentation,
Copyright, Licensing

Dear Sirs:

Referring to the written opinion dated August 10, 2001, and the
extension of term dated October 26, 2001; we hereby respectfully
submit comments to the written opinion.

Objections raised by the Examiner

The Examiner considers the present invention to relate to a method for
providing a measure of an item, i.e. processing information and
mathematical schemes for weighing items. Based on this assumption,
the Examiner states that the application will not be examined
according to Rules 67.1 i), iii), v) and vi) PCT.

Jurisprudence

Guidelines on substantive examination of PCT application are set out in
PCT International Preliminary Examination Guidelines. Initially, the
applicant respectfully submits that for the application of Rule 67, the
Examiner should not apply the relevant criteria more restrictively than
he would in case of a national application. This may in the present case
be interpreted to mean that the most restrictive approach, which the
Examiner may apply, must be in conformance with the Guidelines for
Examination in the European Patent Office.

This observation may be useful when considering that the PCT
International Preliminary Examination Guidelines merely contain
examples on inventions that fall within Rule 67, PCT, rather than
overall instructions to be followed in order to reach a conclusion on
whether a particular invention falls within the scope of Rule 67, PCT.

It is the applicant's opinion that the examples on inventions spelled out in the PCT guidelines on the relevant exclusion clauses, all relate to abstract or intellectual ideas / methods providing no technical effect, comprising no technical features or do not solve technical problems.

This seems to be in accordance with item IV-1.2a (ii) of the PCT Guidelines: The invention must

- A. be of "technical character" to the extent that it must relate to a technical field,
- B. be concerned with a technical problem
- C. have technical features in terms of which the subject-matter for which protection is sought can be defined in the claims.

Thus, the applicant is of the opinion that if an invention as claimed at least fulfils these three criteria, then the Preliminary Examination Authority is required to examine the invention with respect to novelty and inventive step.

Technical character of the invention as claimed

The claim set on file comprises one independent claim, namely claim 1. This claim is considered below and in particular the technical character thereof.

Claim 1 reads as follows:

A method for providing a measure of an item, the method comprising the steps of:

1. reading a first signal being responsive to the measure of the item, the first signal comprising a stream of data,
2. repetitively providing output signal from at least two different processing means until an output signal of a first one of the at least two different processing means fulfils a stability requirement, the output signal being based on processing of the stream of data, and
3. assigning an output signal from the first one of the at least two different processing means that fulfilled the stability requirement to the measure.

Thus, the method as claimed may be viewed as relating to a fast, efficient and robust method for deducting the measure, e.g. the weight, of an item. The method makes use of processing means typically being a programmed digital processor or hardware means (cf. for instance page 5, line 7) which based on said data read, processes the data until one of these means provide a stable processing result. Such a signal from such a particular processing means is assigned to be the result, e.g. the weight of the item.

Based on this, the applicant considers that the invention as claimed in claim 1 relates to the technical field of providing a measure of an item, which measure being preferably the weight of items. This field is indeed a technical field in which considerably technical research is performed. One could for instance consider the food industry where the speed of providing the weight of items directly influences the whole processing speed of food items - as disclosed in the application on pages 1-3.

One problem in connection with providing a measure of an item is realised in connection with providing weight of items and that problem is that the response of scales used depends strongly on the physical interactions between the mechanics of the scale and the items to be measured (weighed). Typical problems occurring are vibrations delaying the time for readout from the scale until such vibrations are mechanically damped out and/or until the effect of the vibrations is filtered out.

The present invention provides a solution to at least the problem of vibrations by use of the processing means (typically being programmed digital processor or hardware processing means) as cited in the claims, which means processes data being responsive to the measure of the item. In a preferred embodiment, this implies that for instance an oscillatory response from the scale is fed into filters that process that signal. Once one of these filters provides a steady result, this result is assigned to be the result, whereby for instance the weight of the item is provided in a very fast manner.

Thus, the present invention provides the technical effect of enabling a scale to provide a weight much faster than a conventional scale.

To conclude, the applicant considers that the present invention as claimed in claim 1 relates to a technical field, solves a technical problem and provides a solution to a technical problem by use of technical means. Thus, the applicant considers all three criteria for qualifying for substantive examination to have been met and the applicant kindly and respectfully asks the Examiner to perform a substantive examination.

Dependent claims

No comments have been put forward on the dependent claims as the applicant is of the opinion that when the corresponding independent claims fulfil the criteria for substantive examination, the dependent claims also fulfil the same criteria.

In case the Examiner does not agree that the invention defined in the claims is novel and involves an inventive step, and that the invention does not fall within Rules 67.1 i), iii), v) and vi) PCT, a telephone interview with the Examiner pursuant to Rule 66.6 PCT is requested prior to the issuance of a preliminary examination report.

Sincerely yours,
A&P Arnason


Gunnar Örn Hardarson

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

| | | |
|----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| Applicant's or agent's file reference P232PC00 | FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below. | |
| International application No. PCT/IS 00/ 00010 | International filing date (day/month/year) 02/10/2000 | (Earliest) Priority Date (day/month/year) 01/10/1999 |
| Applicant MAREL HF. et al. | | |

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 2 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☐ the text is approved as submitted by the applicant.

☒ the text has been established by this Authority to read as follows:

A FAST-RESPONDING ELECTRONIC BALANCE USING A MULTI-FILTER.

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☐ as suggested by the applicant.

☒ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

3
☐ None of the figures.

PATENT COOPERATION TREATY

PCT

REC'D 18 JAN 2002

WIPO

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

12



| | | |
|------------------------------------------------------------------------------------------|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| Applicant's or agent's file reference P 232 PC 00 | FOR FURTHER ACTION | See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) |
| International application No. PCT/IS00/00010 | International filing date (day/month/year) 02/10/2000 | Priority date (day/month/year) 01/10/1999 |
| International Patent Classification (IPC) or national classification and IPC G01G3/10 | | |
| Applicant MAREL HF. et al. | | |

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.
☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☐ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

| | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Date of submission of the demand 26/04/2001 | Date of completion of this report 16.01.2002 |
| Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465 | Authorized officer Koeck, A Telephone No. +49 89 2399 2493  |

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/IS00/00010

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*):

Description, pages:

1-12 as originally filed

Claims, No.:

1-17 as originally filed

Drawings, sheets:

1/2-2/2 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

PATENT COOPERATION TREATY

PCT

NOTIFICATION CONCERNING
SUBMISSION OR TRANSMITTAL
OF PRIORITY DOCUMENT

(PCT Administrative Instructions, Section 411)

From the INTERNATIONAL BUREAU

To:

A&P ARNASON
Borgartun 24
IS-105 Reykjavik
ISLANDE**A&P Arnason**
Intellectual Property Group

16 NOV. 2000

RECEIVED
with thanks

| | |
|----------------------------------------------------------------------|--------------------------------------------------------------------------|
| Date of mailing (day/month/year) 03 November 2000 (03.11.00) | IMPORTANT NOTIFICATION |
| Applicant's or agent's file reference P232PC00 | |
| International application No. PCT/IS00/00010 | International filing date (day/month/year) 02 October 2000 (02.10.00) |
| International publication date (day/month/year) Not yet published | Priority date (day/month/year) 01 October 1999 (01.10.99) |
| Applicant MAREL HF. et al | |

1. The applicant is hereby notified of the date of receipt (except where the letters "NR" appear in the right-hand column) by the International Bureau of the priority document(s) relating to the earlier application(s) indicated below. Unless otherwise indicated by an asterisk appearing next to a date of receipt, or by the letters "NR", in the right-hand column, the priority document concerned was submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b).
2. This updates and replaces any previously issued notification concerning submission or transmittal of priority documents.
3. An asterisk(*) appearing next to a date of receipt, in the right-hand column, denotes a priority document submitted or transmitted to the International Bureau but not in compliance with Rule 17.1(a) or (b). In such a case, **the attention of the applicant is directed** to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.
4. The letters "NR" appearing in the right-hand column denote a priority document which was not received by the International Bureau or which the applicant did not request the receiving Office to prepare and transmit to the International Bureau, as provided by Rule 17.1(a) or (b), respectively. In such a case, **the attention of the applicant is directed** to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

| <u>Priority date</u> | <u>Priority application No.</u> | <u>Country or regional Office or PCT receiving Office</u> | <u>Date of receipt of priority document</u> |
|-------------------------|---------------------------------|---------------------------------------------------------------|-------------------------------------------------|
| 01 Octo 1999 (01.10.99) | 5207 | IS | 16 Octo 2000 (16.10.00) |

| | |
|--------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. (41-22) 740.14.35 | Authorized officer Aino Metcalfe Telephone No. (41-22) 338.83.38 |
|--------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/IS00/00010

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application.

☐ claims Nos. .

because:

☒ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):
see separate sheet

☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☐ no international search report has been established for the said claims Nos. .

2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

☐ the written form has not been furnished or does not comply with the standard.

☐ the computer readable form has not been furnished or does not comply with the standard.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/IS00/00010

III. Non establishment of opinion

1. The present claims relate to a method for providing a measure of an item, i.e. processing information and mathematical schemes for weighting items. The application will thus not be examined according to Rules 67.1 i), iii), v) and vi) PCT. The examining is unable to see any technical features in the claimed methods relating to inputting data, manipulating said data and outputting said data. In the simplest case, the data may be input manually through a keyboard, processed in a computer and output on the screen. That is, the method merely relates to a computer program devoid of technical features, which is excluded from examination according to Rule 67.1 (vi).
- 2 According to Rule 66.6 PCT, a personal interview may be allowed by the examining authority if requested by the applicant. The applicant has however only a requested a telephone communication.

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

To:

A&P ARNASON
Borgartun 24
105 Reykjavik

A & P Arnason
Intellectual Property Group

18 JAN. 2002

RECEIVED
with thanks

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL PRELIMINARY
EXAMINATION REPORT
(PCT Rule 71.1)

Date of mailing
(day/month/year) 16.01.2002

Applicant's or agent's file reference
P 232 PC 00

IMPORTANT NOTIFICATION

International application No.
PCT/IS00/00010

International filing date (day/month/year)
02/10/2000

Priority date (day/month/year)
01/10/1999

Applicant
MAREL HF. et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/

 European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0 Tx: 523656 epmu d
Fax: +49 89 2399 - 4465

Authorized officer

Choulouilidou, C

Tel. +49 89 2399-2257




PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT
OR THE DECLARATION


(PCT Rule 44.1)

| |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| To: A&P ARNASON Borgartun 24 105 Reykjavik <div style="text-align: center; margin-top: 10px;">  17 APR. 2001 RECEIVED with thanks </div> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| | |
|-------------------------------------|-------------------|
| Date of mailing (day/month/year) | 11/04/2001 |
|-------------------------------------|-------------------|

| | |
|-----------------------------------------------------------|-----------------------------------------------------------------|
| Applicant's or agent's file reference P232PC00 | FOR FURTHER ACTION See paragraphs 1 and 4 below |
| International application No. PCT/ IS 00/ 00010 | International filing date (day/month/year) 02/10/2000 |
| Applicant MAREL HF. et al. | |

| | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. | <input checked="" type="checkbox"/> | The applicant is hereby notified that the International Search Report has been established and is transmitted herewith. Filing of amendments and statement under Article 19: The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46): When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet. Where? Directly to the International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35 For more detailed instructions, see the notes on the accompanying sheet. |
| 2. | <input type="checkbox"/> | The applicant is hereby notified that no International Search Report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith. |
| 3. | <input type="checkbox"/> | With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that: <div style="margin-left: 20px;"> <input type="checkbox"/> the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices. <input type="checkbox"/> no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made. </div> |
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(54) Title: **MULTI-FILTER**

(57) Abstract: The present invention relates to a method for weighing items and in particular to a method of filtering signals representing the weight of an item. The invention is applicable in all measuring instruments which indicate an average value calculated from a signal which also has unwanted components of one or more unknown frequencies. This is, for example, the case in voltmeters, ampere meters and weighing-scales. Normally, the indicated result is the average value of the signal measured for a much longer time than the expected period of the slowest frequency component. This method is well known and reliable, but has the drawback of being very slow in situations where measuring speed is of importance.

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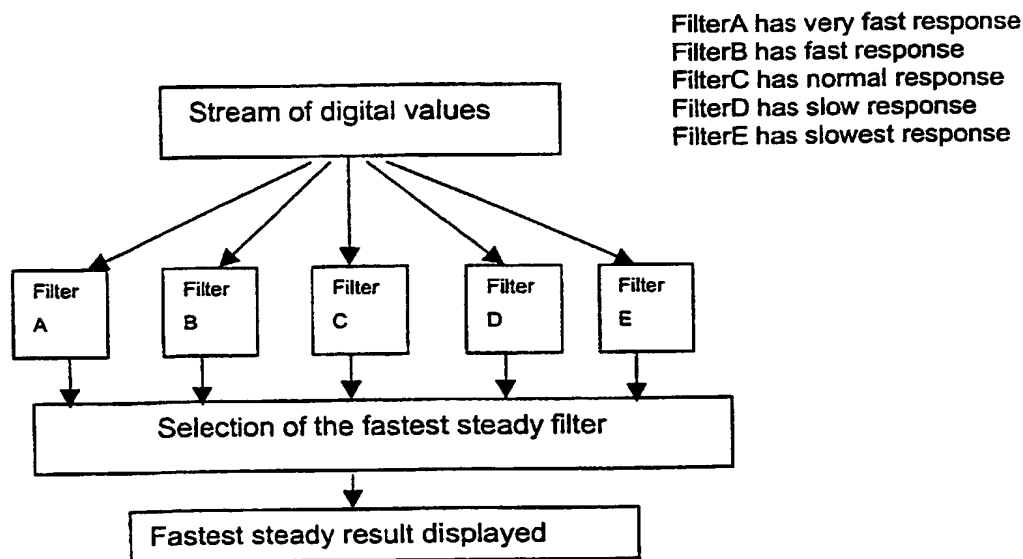
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(54) Title: **A FAST-RESPONDING ELECTRONIC BALANCE USING A MULTI-FILTER**



(57) Abstract: The present invention relates to a method for weighing items and in particular to a method of filtering signals representing the weight of an item. The invention is applicable in all measuring instruments which indicate an average value calculated from a signal which also has unwanted components of one or more unknown frequencies. This is, for example, the case in voltmeters, ampere meters and weighing-scales. Normally, the indicated result is the average value of the signal measured for a much longer time than the expected period of the slowest frequency component. This method is well known and reliable, but has the drawback of being very slow in situations where measuring speed is of importance.

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MULTI-FILTER

Field of the Invention

- 5 The present invention relates to a method for weighing items and in particular to a method of filtering signals representing the weight of an item.

The invention is applicable in all measuring instruments which indicate an average value calculated from a signal which also has unwanted frequency components of one or more
10 unknown frequencies.

This is, for example, the case in voltmeters, ampere meters and weighing-scales. Normally, the indicated result is the average value of the signal measured for a much longer time than the expected period of the slowest frequency component. This method is
15 well known and reliable, but has the drawback of being very slow in situations where measuring speed is of importance.

The invention is of particular importance in high speed weighing scales. In that case, the average value is the result (the weight) but because of vibrations in the mechanics of the
20 scale and its base, a lot of unwanted frequency components are added to the measured value.

Description of the Prior Art

- 25 Electronic scales comprising a load cell providing readout in terms of voltage representing the weight of the item today perform weighing of items. This readout is typically passed through an analogue to digital (A/D) converter that converts the electrical signal to a digital signal normally represented by a bit representation of a number. This bit representation is then manipulated further in order to provide an readout of the weight of the item on
30 display.

When an item is to be weighed by such an electronic scale - or in general by an ordinary scale - the item is arranged on a scale platform. As the mechanical parts of the scale are not weightless the scale platform and the parts connected to the platform may be able to
35 vibrate which in turn influences the readout - the measurement - of the scale. The

vibration may in general be induced by at least two measures: the way the item is arranged on the scale platform and the vibrations of the surroundings.

5 The first measure may for instance be instanced by dropping an item on to the scale platform - a situation, which for instance occur in a process line in which items are being conveyed from a processing station past a weighing station to a grading and/or packing station.

10 The second measure may for instance be instanced when the scale is applied in an environment in which heavy machinery inducing vibrations is present.

15 In both cases, or of course in combinations of these, the signal of from the load cell and in turn the readout of the weight will follow a curve which ideally can be described as the motion of a damped oscillation, where the average value of curve is the final steady state value, i.e. the weight which is to be determined.

In weighing scales there are mostly 3 types of unwanted frequency components. These occur due to:

- 1 Steady vibrations in the base of the scale from nearby machinery.
- 20 2 Vibrations which occur when an object is placed on the platform. These vibrations cease when the mechanism becomes stable.
- 3 Short-duration mechanical transients which hit the base of the scale.

25 Every scale designer wants to make a fast scale, which displays the correct result as soon as an object is placed on the platform. A faster scale saves both time and money. At the same time, he wants the scale to be insensitive to vibrations and shocks that strike the platform or the base of the scale. Unfortunately, it is difficult to achieve both features at the same time using only one filter.

30 If a fast low pass filter is used - with a high cut-off frequency, the scale will be fast, but vibrations and shocks will affect it, leading to unsteady results. Conversely, if a slow low pass filter is used - low cut-off frequency, the scale will be less sensitive to transients and unwanted frequency components, but the scale will be slow to display results.

Weighing scales must show reliable results, along with an indication on the stability of the scale. As a result, designers usually use a slow filter to minimise the risk of the scale being unsteady all the time, and therefore being of no use.

5

The invention is very useful, as it allows the use of fast filters without the risk of the scale being useless if the base is vibrating.

10

In known systems the signal from the load cell is filtered either through digital or analogue means with a "low pass filter". A low pass filter is attenuating all parts of the signal having a higher frequency than the selected cut-off frequency. By using low pass filtering a steady readout is obtained faster than if no filter is applied as the mechanical system then has to be in rest before a steady readout is available.

15

The optimal cut-off frequency is typically a function of the weight of the moving parts of the scale, the weight of the item to weight, the mechanical damping characteristics of the scale and the vibrations induced by the surroundings. This means that the scale typically is equipped with more than one cut-off filter in order to be able to work as fast as possible in different environments and with items of varying sizes.

20

A major problem with these known systems is however that if the vibrations due to placing items on the scale platform vary considerably for instance from one item to another, and/or the vibrations induced by the surroundings also vary, then a single filter with a fixed cut-off frequency will not always yield the fastest possible weighing result and readout of the scale.

25

The speed of weighing is important, as it is frequently the limiting time factor in a grading process.

30

The most common method of selecting an optimal filter on weighing instruments is to do it manually. A manual change or selection of filter is in nature quite slow as it involves an operator changing the set-up of the scale. Furthermore it may not be possible to select the most optimal filter manually. As an example the measures induced by the way the items are being arranged on the scale or induced by external conditions, such as heavy traffic

occurring in the weighing area could change instantly, whereby manual setting would not practically be possible.

Description of the Invention

5

It is an aim of the present invention to provide a method for automatically selecting an optimal low pass filter having the best cut-off frequency such that weighing of items may be performed as fast as possible with a particular scale and so that the scale will always respond to the actual conditions of the weighing.

10

Accordingly the present invention relates to a method for providing a measure of an item, the method comprising the steps of:

- reading a first signal being responsive to the measure of the item,
- 15 – frequently measuring a plurality of values of the signal so as to provide a stream of data,
- repetitively providing output signals from at least two different processing means until an output signal of a first one of the at least two different processing means fulfils a stability requirement, the output signals being based on processing of the stream of
- 20 data, and
- assigning an output signal from the first one of the at least two different processing means that fulfilled the stability requirement to the measure.

The measure of the item could as an example be the weight of the item, the size of the

25 item, the colour of the item or any other measure of the item. As an example the first signal being responsive to the measure of the item could be an electrical current from an electrical scale, the voltage, the resistance or the current being responsive to the weight of the item. As another example the first signal could be an electrical current provided e.g. by a CCD of a digital camera. In that case the conversion of the signal into a stream of

30 data would typically happen internally in a processor of a digital camera or camcorder.

In a broad aspect, the present method according to the present invention is applicable to any kind of processing of a stream of digital signals being the result of for instance an analogue-to-digital conversion, the analogue signal being the result of some recognition -

35 or measuring - of one or more physical quantity, such as a weight of an item.

In the present content, a digital signal denotes a signal being represented by a stream or a series of digital values, ordered sequentially by time.

5 In a preferred embodiment of the present invention the stream of digital values (signals) is a substantially constant inflow of digital values to the processing means. The processing means are preferably numerical algorithms executed in a digital processor such as a microcomputer, but hardware processing means may also be used in connection with the present invention.

10

The processing means, which in general are different, are different in the sense that the processing performed by them are said to vary in degree. By this varying processing degree is meant that for instance the cut-off frequencies of the processing means, in case these are characterised as filters are different. In other cases, the difference may be the way they process the digital signals such as one processing giving a average value and another processing means giving a filtered value (please note that in some case process providing an average value is referred to as a filtering process).

15

In the broad aspect of the present invention each of the processing means provides an intermediate output signal. These signals are in general different, as they are the results of applying the processing means, which are different, to the stream of digital values. After these intermediate signals are made available by the processing means the method according to the present invention detects the signal being the most appropriate for the time being, i.e. the signal from the fastest filter which fulfils a stability requirement. The most appropriate signal is assigned to be the output signal.

20

25

According to a preferred embodiment of the invention the processing means calculates an average value of N last provided data of the stream of data. N could denote the 10, 100 or even 1000 latest provided data. In the case a small number of data is used for the calculation of the average, the processing means would be very fast but on the other hand the output signals from the processing means could be rather fluctuating. If a larger number of data is used, the processing means would be slower but the output signal would typically be more stabile. The number of data N could preferably be selected differently for each of the processing means applied. In that sense the processing means

30

would have different reaction speed and their output signal would have different characteristics.

5 The stability requirement to be fulfilled could simply be comparing an output signal of one of the at least two processing means with a reference value. The reference value could be the last output signal of the same processing means or an output signal of one of the other processing means. Accordingly the stability requirement could be a requirement to a maximum difference between two successive output signals of one of the processing means.

10

Preferably one of the processing means is working in a large domain of data, such as on a set of data including a larger number N of data. The other processing means are then working on smaller sub-set of the N data. If the processing means are processing averages of the data, the one of the processing means that works with the large domain would be relatively slow compared with the other processing means. On the other hand the fluctuation in the output signal of the processing means working in the large domain of data would be relatively low.

15

As an example the processing means could be provided in the form of digital filters for filtering the stream of data. The digital filter could be low-pass filters running averaging algorithms numerically evaluating the mean values of the stream of data.

20

Preferably the running averaging algorithms are applied successively; the next algorithm applied is applied based at least partly on the result of the previously applied algorithm.

25

In case no output signals fulfils the stability requirement, an output signal from the last one, or the slowest one of the processing means could be assigned to the measure. The slowest one of the processing means would in the case of processing averages be the one processing the largest number N of data. If no output signals fulfils the stability requirement, an output signal from one of the "medium speed" processing means may also be selected, e.g. one running averaging with a medium number N of data or actually any one of the processing means may be selected.

30

Detailed description of the invention

In the following the invention and particular preferred embodiments thereof will be described in greater details with reference to the accompanying figures in which:

5

Fig. 1 is a schematic drawing of an electronic weighing scale,

Fig. 2 shows a diagrammatic view of the main elements of the method of weighing according to the present invention,

10

Fig. 3 shows a schematic drawing of a preferred embodiment of the filtering method according to the present invention,

15

Fig. 4 shows a flow chart of a preferred embodiment of the filtering method according to the present invention.

20

In fig.1 a typical electronic scale 10 is shown. The scale 10 comprises a base part 20 wherein a load cell 60 is situated, a scale platform 40 on which the item to be weighed is placed and display 50. The scale 10 also comprises a logical unit such as a computer or a micro-controller for transforming the signal coming from the load cell 60 to a readout on the display 50.

25

In fig. 2 the electronics comprised in the scale 10 are schematically depicted. The actual choice of electronic components is not crucial for the invention as ordinary known electronically components may be used. Referring to fig. 2 the load cell 60 which may comprise a strain gauge acting as a resistor in a Wheatstone bridge circuitry is actuated by for instance a rod connected to the scale platform 40.

30

The load cell 60 will thereby provide an electrical signal with a magnitude representing the force of the scale platform 40 applied to the load cell 60. This force will in general be different from the weight of the moving part of the scale plus the force due to the weight of the item times the gravity constant until these parts are in rest. This as the movement of the parts involves acceleration of the parts.

The signal coming from the load cell 60 is then directed to an A/D-converter 70 from which a bit pattern representing the actual amplitude of the signal from the load cell is provided at a predetermined sampling rate. The sampling rate and the resolution of the A/D-converter may be determined by the physics of the scale.

5

The bit pattern is then directed to a micro-controller 80 being able to perform a filtering of the signal. Referring to Fig. 3, the filtering is performed by use of, for instance, five low pass filters having different cut-off frequencies:

10

The low pass filters can for example be implemented as moving average filters.

A moving average filter calculates the average value from a set of N last digital values in a stream of data. The size of the set N determines the response or behaviour of the filter as well as the sampling rate of the data. If the filter uses many digital values in the calculation then a single new input value will have little effect on the average and the filter will slowly change the result as the input data changes. On the other hand if the filter is calculating average from a few digital values, the average changes quickly if the newest value is changed

15

The following is an example of filters that may be used in connection with weighing according to the present invention.

20

Filter A (very fast response – very sensitive to exterior vibrations). The filter has only 1 digital value. The result is:

25

$$\bar{x}_1 = \frac{\text{newest_digital_value}}{1}$$

Filter B (fast weighing). The filter calculates the average of the last 2 digital values in the input stream. The result is:

30

$$\bar{x}_2 = \frac{\text{newest_digital_value} + \text{the_value_before}}{2}$$

Filter C (normal weighing). The filter calculates the average of the last 4 digital values in the digital stream.

$$\bar{x}_4 = \frac{value_1 + value_2 + value_3 + value_4}{4}$$

Filter D (slow weighing) The filter calculates the average of the last 8 digital values in the input stream,

$$\bar{x}_8 = \frac{\sum_{i=1}^8 value_i}{8}$$

Filter E (slowest weighing not sensitive for exterior vibrations) The filter calculates the average value of the last 16 digital values in the input stream,

$$\bar{x}_{16} = \frac{\sum_{i=1}^{16} value_i}{16}$$

The filtering is performed by the following scheme. Each time a value is available at the output of the A/D-converter, this value is directed to the filtering means. The filtering means holds a list of values corresponding to a pre-selected number of earlier measured values. Each filter is activated and determines filtered intermediate filtered values, one for each filter, based on the new value and the old values except the oldest.

For each of the filters applied, the intermediate filtered values are checked for stability, i.e. the most recent determined intermediate value corresponding to a specific filter is compared with the value determined last time the same filter was activated. If the difference between these two successive intermediate values is within a certain limit then the signal filtered with the specific filter is said to be stable.

In many practical applications more than one intermediate value is found to be stable and in that case the intermediate value corresponding to the fastest filter is selected as the output value from the filtering routine. The reasoning behind choosing the value corresponding to the fastest filter is that this choice will provide the earliest stable readout.

According to the general aspect of the present invention a selection of the most appropriate filter is done. Before going into a detailed description of the selection routine

and a preferred embodiment of this and the filters applied, the general structure of the filtering routine is explained with reference to Fig. 3.

5 The digital weight signal, Input value of Fig. 3, provided by the A/D-converter is filtered with a number of different filters, Filter A, Filter B, Filter C, Filter D and Filter E of Fig. 3. The output from each filter is checked for stability and the least filtered (fastest) steady value is selected. This will give the fastest possible response. Fig. 4 is a flowchart showing the Multi-Filter System principle.

10 In the following text filter algorithm to be used in connection with the present invention will be introduced. The features of the method according to the present invention may in general be described by the following item list:

- There are several low-pass filters running at the same time.
- 15 • The invention deals with the selection of the filters in real time
- The lowpass filters have different corner frequencies, but their exact implementation is not important.
- The software selects in real time the fastest steady filter.
- If no filter gives a steady result one of the medium ones is normally selected.

20

The method according to the present invention works in the following way, when considering different situations:

Steady vibrations attack the base of the scale:

25

- Only some of the slowest filters will produce steady results, and for each item being weighed, the filter producing a steady result fastest, will be used.
- The scale will work accurately, but will be slow.

30

Vibrations occur when an object is placed on the platform and stop when the mechanical structure becomes stable:

- A signal will be formed when the object is put on the platform but it will have unwanted frequency components because of the vibration.
- 35 • The results from all filters are monitored and the result from the first filter to show a steady result will be used.

- Which filter will be the first filter to give a steady result depends on the system character and the vibrations,
- In a well-designed system, the fastest filter would be the first to become stable if no vibration exists in the base.

5

Transient shocks on the base:

- In this case the fastest filters will give unsteady result, and the software will look for a slower filter still not affected by the shock.
- The displayed result remains steady until the slowest filter gives an unsteady result. This gives the scale the stability of the slowest filter.

10

Steady calculation:

- 15 One way of detecting a steady result from a filter is to calculate the difference between the last two results and compare it to a predetermined small value. If the difference is greater than the value, the filter result is not stable. The time between any two results is normally constant, for example 50 or 100 milliseconds.

- 20 It is also possible to use a change in the final displayed result (weight) as an indication of a steady result. This can be an advantage in weighing scales where the displayed weight must be rounded in certain way to comply with "General Weights and Measures" regulations. The method can give better results but requires more processing power.

- 25 Fig. 4 shows a flowchart describing the invention.

Following method according to the present invention is described with reference to a program which, when launched in a computer will perform the selection of the optimal filter. The program is described in Pascal like language and comprises the following

30 statements:

The first 17 lines are comments.

```

*   FilterA  A variable that holds the result of a FilterA  (very fast response)
*   FilterB  A variable that holds the result of a FilterB  (fast response)
*   FilterC  A variable that holds the result of a FilterC  (normal response)
5  *   FilterD  A variable that holds the result of a FilterD  (slow response)
*   FilterE  A variable that holds the result of a FilterE  (slowest response)
*
*   Filter_A_steady  A flag that is true if FilterA gives a steady result
*   Filter_B_steady  A flag that is true if FilterB gives a steady result
10 *   Filter_C_steady  A flag that is true if FilterC gives a steady result
*   Filter_D_steady  A flag that is true if FilterD gives a steady result
*   Filter_E_steady  A flag that is true if FilterE gives a steady result
*   Optimal_Result  A variable that holds the selected, optimal result
*
15 *
*
*   The following is the program describing the invention
*
Repeat
20   Get_new_ADvalue ;           * Get a new value from the A/D converter
   Calculate_new_results ;      * All filters are recalculated
   Optimal_Result := FilterC ;  * Use normal response filter if no filter is
stable
   If Filter_E_steady THEN Optimal_Result:= FilterE ;
25   If Filter_D_steady THEN Optimal_Result:= FilterD ;
   If Filter_C_steady THEN Optimal_Result:= FilterC ;
   If Filter_B_steady THEN Optimal_Result:= FilterB ;
   If Filter_A_steady THEN Optimal_Result:= FilterA ;
   Display(Optimal_Result) ;    * Display the result from the fastest steady
30 filter
until false

```

CLAIMS

1. A method for providing a measure of an item the method comprising the steps of:
- 5 – reading a first signal being responsive to the measure of the item, the first signal comprising a stream of data,
 - repetitively providing output signals from at least two different processing means until an output signal of a first one of the at least two different processing means fulfils a stability requirement, the output signals being based on processing of the stream of data, and
 - 10 – assigning an output signal from the first one of the at least two different processing means that fulfilled the stability requirement to the measure.
2. A method according to claim 1 wherein the first signal is measured as a signal and
- 15 wherein a plurality of values of the signal frequently is being measured so as to provide a stream of data.
3. A method according to claim 1 or 2, wherein the processing comprises calculating an average value of N last provided data of the stream of data.
- 20 4. A method according to any of the preceding claims, wherein each of the at least two different processing means processes an average value of a number of last provided data of the stream of data N and wherein N is a different number for each of the processing means.
- 25 5. A method according to any of the preceding claims, wherein the stability requirement to be fulfilled comprises comparing an output signal of one of the at least two processing means with a reference value.
- 30 6. A method according to any of the preceding claims, wherein the stability requirement to be fulfilled comprises a requirement to a maximum difference between two successive output signals of one of the at least two processing means.
- 35 7. A method according to any of the preceding claims, wherein a first set of data comprising a number N of data from the stream of data is processed by one of the at least

two different processing means and wherein the remaining processing means are processing sub-sets of the first set of data.

5 8. A method according to any of the preceding claims, wherein the first signal is an electrical current provided by an instrument .

9. A method according to claim 8, wherein the electrical current is converted into a stream of digital data by means of an A/D converter.

10 10. A method according to any of the preceding claims, wherein the first signal is representing responses to weighing of an item on a weighing scale.

11. A method according to any of the preceding claims, wherein the processing means comprise(s) digital filters for filtering the stream of data.

15

12. A method according to claim 11, wherein the digital filters comprise low-pass filters.

13. A method according to claim 12, wherein the low-pass filters are running averaging algorithms numerically evaluating the mean values of the stream of data.

20

14. A method according to claim 13, wherein the sets of measured data to be used in the running averaging algorithms are series of numbers 2, 4, 8, 16 numbers of values of the stream of data.

25 15. A method according to claim 13 or 14, wherein the running averaging algorithms are applied successively; the next algorithm applied is applied based at least partly on the result of the previously applied algorithm.

30 16. A method according to any of the preceding claims, wherein an output signal from the last one of the at least two different processing means is being assigned to the measure in case no output signal fulfils the stability requirement.

35 17. A method according to any of the preceding claims, wherein an output signal from a processing means with a medium processing speed is being assigned to the measure in case no output signal fulfils the stability requirement.

▲▲ KO

▲ Del. by Ro

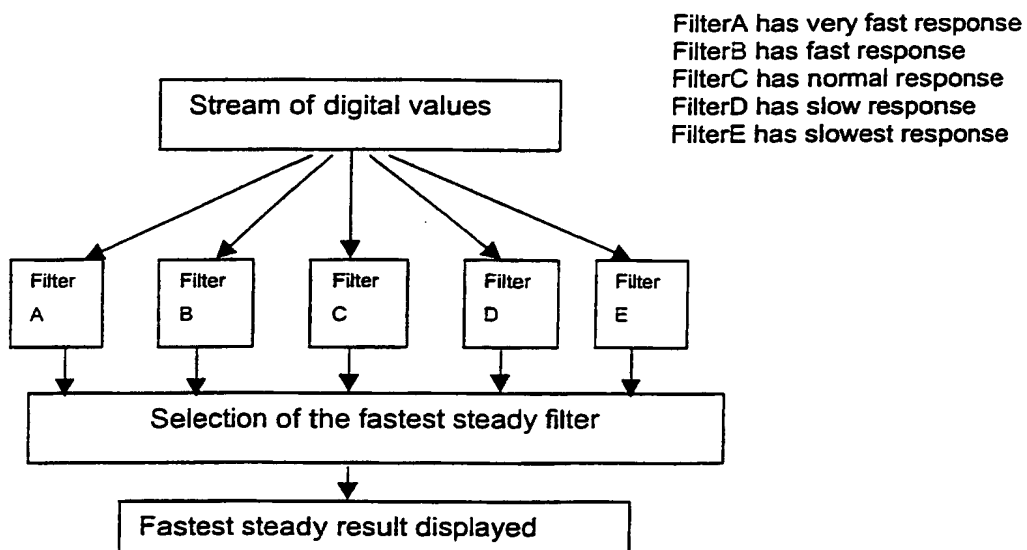
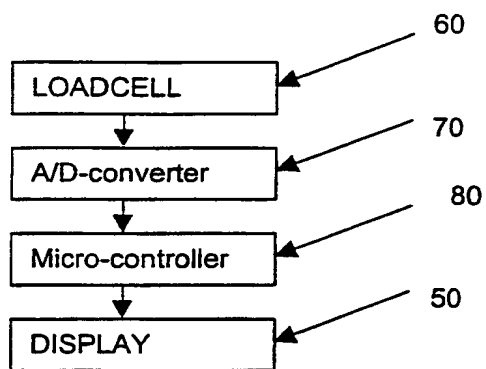
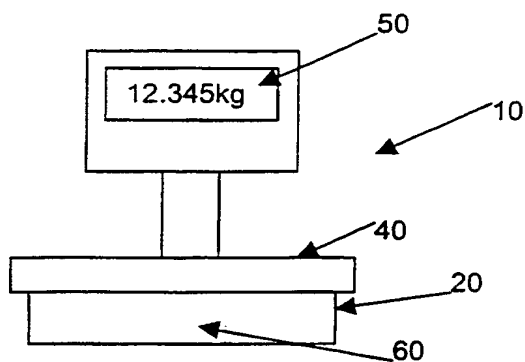


Figure 3

▲ RO

▲ Del. by RO

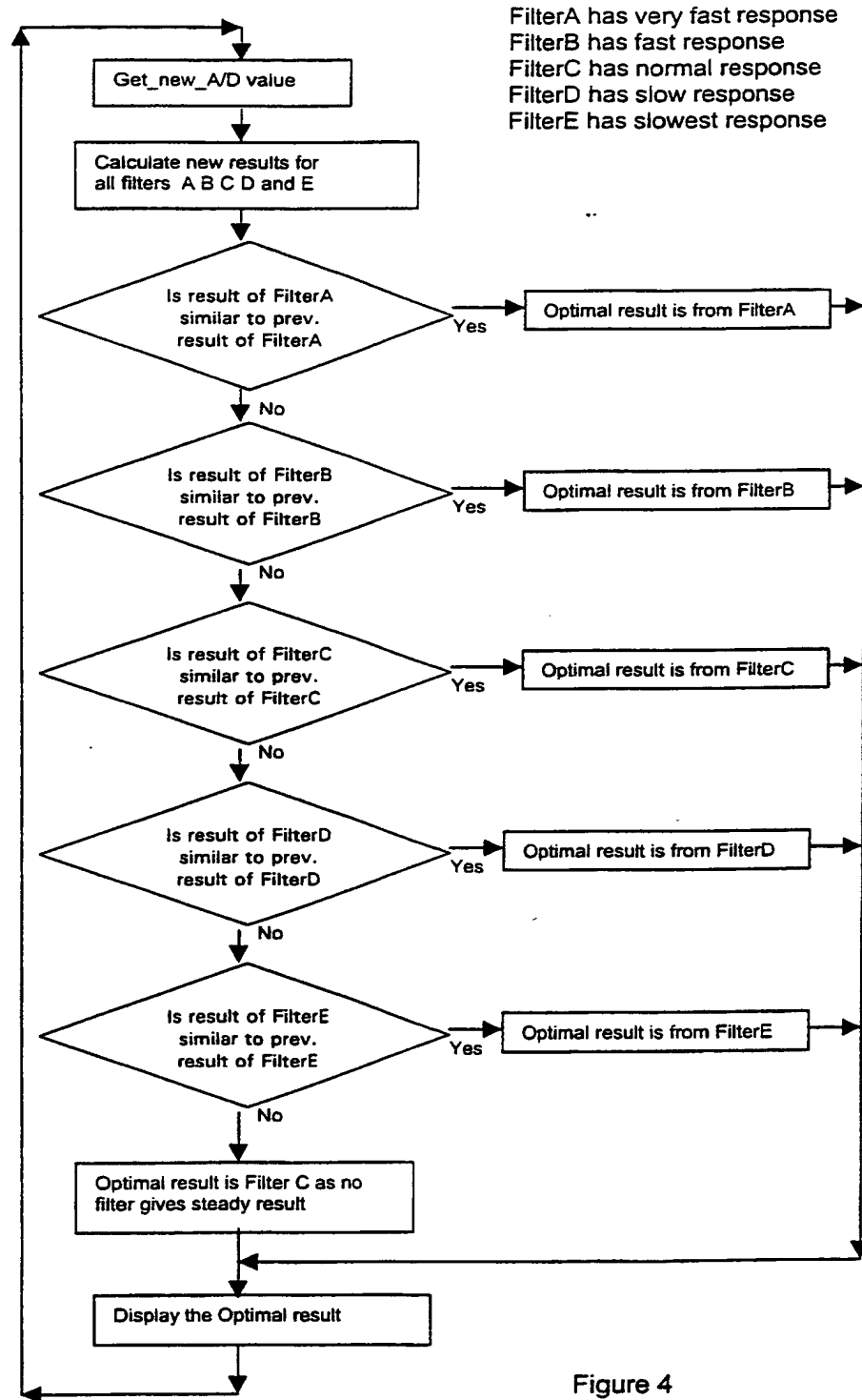


Figure 4

INTERNATIONAL SEARCH REPORT

International Application No

I 715 00/00010

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G01G23/10 G01G23/24

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G01G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category ° | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
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| A | US 4 782 904 A (BROCK CHRISTOPHER W) 8 November 1988 (1988-11-08) the whole document --- | 1-17 |
| A | US 5 130 938 A (INOUE SHINICHI) 14 July 1992 (1992-07-14) the whole document ----- | 1-17 |

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

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 "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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 "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
 "&" document member of the same patent family

Date of the actual completion of the international search

19 December 2000

Date of mailing of the international search report

11.04.01

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

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| Patent document cited in search report | | Publication date | Patent family member(s) | Publication date |
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